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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/638,398	08/15/2000	Katsumi Nakagawa	35.C12475DIV.I	3548

5514 7590 10/04/2002

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EXAMINER

MULPURI, SAVITRI

ART UNIT	PAPER NUMBER
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2812

DATE MAILED: 10/04/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/638,398

Applicant(s)

Nakagawa et al

Examiner

Savitri Mulpuri

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on Aug 26, 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 29, 52-67, 82, 83, 85, 86, 94, 95, and 97-110 is/are pending in the application.
- 4a) Of the above, claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 29, 52-67, 82, 83, 85, 86, 94, 95, and 97-110 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
*See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). _____ 6) ☐ Other:

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DETAILED ACTION

This action is in response to the applicant's request for continued examination filed on 8/26/02.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 29, 52-57, 60-67, 82-83, 85-86, 88, 102-110 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo et al (US 5,536,361) Matsushita et al (5,811,348) Yonehara et al, and Sakaguchi et al (US 5,492,859 or 5,277,748) in combination with Baliga et al.

Kondo et al teaches a method of making a solar cell by the following process steps: Forming porous layer on a surface of the first substrate, growing epitaxial layer by LPE, bonding second substrate to epitaxial layer; separating the first substrate from first substrate by utilizing the porous layer to transfer epitaxial layer to second substrate (see abstract and claim 1, col. 4, line 17). Yonehara and Matsushita et al or Sakaguchi et al teaches a method making solar cells including LPE, which is similar process as claimed (see abstract and claim 15 in Yonehara and claim 1 in Matsushita et al). Kondo, Yonehara or Matsushita et al all discloses forming growing silicon layer by LPE. Sakaguchi further discloses leaving portion of porous layer on the first substrate.

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None of the references teaches some particulars of the LPE condition as instantly claimed to form pn-junction under reduced atmosphere. Baliga teaches LPE technique for forming p-type silicon epitaxial layer followed by n-type silicon epitaxial layer under reduced atmosphere to form pn junctions. Baliga particularly teaches high purity tin melt is saturated with silicon, which is met by instant claim limitation (see abstract and col. 2, lines 32-45 and col. 1, lines 60-68; col. 2, lines 10-43, col 3, 50-59). It would have been obvious to one of ordinary skill in the art to form additional opposite conductivity type silicon layer by LPE at reduced temperature in the invention of Kondo et al , Matsushita et al, Yonehara and Sakaguchi et al.

As claimed in claims 102,104,109,110 with respect to impurity doping into transferred layer is obvious process steps to form pn junctions, thereby completing semiconductor such as solar cells.

Claims 58 and 59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo, Yonehara or Matsushita et al or Sakaguchi as applied to above listed claims and further in view of Hokuyou.

Hokuyou teaches, after bonding and separating the first substrate for making solar cells, first substrate can be used to repeat the same process for making solar cells(see col. 3, lines 54-56). It would have been obvious to one of ordinary skill in the art to use the substrate for making another set solar cells by using the same first substrate and thereby reducing the cost and weight.

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Claims 94-95, 97-101 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo, Yonehara or Matsushita et al or Sakaguchi as applied to above claims above, and further in view of Sullivan et al.

None of the references teach using water soluble adhesive on the second substrate before bonding. Sullivan teaches forming adhesive e.g., resin or glue on the porous substrate "26" ; bonding the substrate "26" with first substrate "20" having plural device layers followed by release of first substrate "20"; then bonding the second substrate "26" having device layers to third substrate "30"; Sullivan further teach solvent, which is dissolvable adhesive will go to porous substrate "26" to promote fast release. Releasing the second substrate from third substrate is by using chemical technique to dissolve the adhesive, which could be inherently water to leave the device layers on third substrate "30" (see figs 2 A-2 F and detailed description).

Response to the applicant's arguments: Applicant argues that Baliga teaches different from the teaching of claimed invention. However, Baliga teaches, in first embodiment, growing epitaxial layer with the tin melt may be unsaturated as similar to claims in 29, 57 and in second embodiment, melt may be saturated with silicon as similar to claim 52. Applicant argues that Baliga teaches substrate temperature in second embodiment is higher than melt temperature 5 C and such process is opposite to claimed process. However, Baliga is relied on broadly teaching of liquid phase epitaxy in pure tin melt either saturated or unsaturated with elements under reduced atmosphere, wherein both met temperature and substrate temperature are approximately 950 C (see claims 6,7).. Baliga increases the substrate temperature by 5 C is to increase silicon

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solubility in the melt there by obtaining graded p- type layer at the interface of the epitaxial layer and substrate. Conclusively, Baliga process to higher substrate temperature is obtain graded p-layer. Baliga first embodiment does not teach higher substrate temperature.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Prior art , in general, teaches method of making solar cell.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to S. Mulpuri whose telephone number is (703) 305-5184. The fax phone number for the organization where this application or proceeding is assigned is (703) 308-7722.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-4900.


SAVITRI MULPURI
PRIMARY EXAMINER